Biodiversity Conservation at the Landscape Scale

A Program of the Wildlife Conservation Society
Supported by the USAID/EGAT Global Conservation Program

The Maya Biosphere Landscape Conservation Area, Guatemala
Implementation Plan FY 2006

October 2005 – September 2006

Program Goal
To ensure the conservation of biological diversity in regions of global biodiversity importance, using a species-based landscape approach.

The Wildlife Conservation Society believes that protected areas must remain at the core of all nations' biodiversity conservation plans. These areas typically contain a higher diversity and abundance of plants and animals than landscapes managed primarily for economic use. Yet, parks and reserves are always embedded in larger, human-dominated landscapes and are seldom sacrosanct. Regardless of how large or small a protected area may be, the plants and animals it contains are often threatened either directly or indirectly by human resource use activities.

Management of parks and reserves cannot, therefore, occur in isolation from the surrounding human-dominated landscape, but must take into account where and how human activities conflict with biodiversity conservation, and where conservation adversely impacts human welfare. As human populations continue to expand over the next 50 years, the incentive for over-exploiting natural resources within and outside of protected areas will likely increase and the need for biodiversity conservation tools that address human-wildlife conflict will become even more important.

The Living Landscape Program promotes conservation of landscapes by focusing efforts on key animal species that require large areas for their conservation, are particularly at risk because they cross land use and jurisdictional borders, and when protected will have the greatest positive impact on biodiversity as a whole. These landscape species are highly mobile, vulnerable animal species, and their conservation fosters a focused and cost-effective way to retain a full complement of biodiversity and overall ecological integrity. To conserve these species, parks and reserves must be integrated into the broader landscape, a landscape in which people exploit natural areas and wild species to meet their socio-economic needs.

The BCLS Program is designed to ensure biodiversity conservation in four core sites by identifying actions to conserve landscape species, and by increasing the capacity of local and national organizations to implement such actions. The current four areas of global biodiversity importance for WCS involvement and USAID support are:

- Northwestern Bolivian Andes Landscape Conservation Area (Bolivia)
- Glover's Reef Living Seascape (Belize)
- Maya Biosphere Reserve Living Landscape (Guatemala)
- The Eastern Steppe Living Landscape (Mongolia)

Maya Biosphere Living Landscape Project Strategy
At 2,112,940 hectares, the Maya Biosphere Reserve is the largest protected area complex in Central America (Figure 1). Its subtropical moist forest, savannah, and wetlands account for more than one-seventh of the surface area of Guatemala and form the core of a tri-national system of protected areas in Guatemala, Belize, and Mexico. It is a reservoir for Central American biodiversity, and has been internationally recognized as a priority "Hotspot", a "Last Wild Place", and as a World Heritage Site. The Reserve hosts one of the world's highest concentrations of endemic species, and retains an intact suite of wide-ranging mammal and bird species extirpated in many parts of Mesoamerica. Furthermore, beneath the canopy of this subtropical moist forest lies the epicenter of the ancient Maya civilization. The Maya Biosphere Reserve (MBR) was established in 1990 to conserve these biological and cultural wonders while

improving the livelihoods of local inhabitants. As a consequence of the great extent of intact forest, wide-ranging species extirpated in many parts of Central America such as the jaguar, puma, white-lipped peccary, Baird's tapir, and scarlet macaw have been maintained. The Maya Biosphere Reserve also supports one of the highest levels of endemism worldwide. The percentage of endemism in the lowland Maya Forest varies between groups, ranging from 3.8% of bird species to 28.9% of amphibian species. Comparing these levels with those of the top 25 priority "Hotspots", designated by Conservation International (Meyers et al. 2000[1]); it is evident that the Maya Forest is of high global importance as a center of endemism. Nevertheless, threats are numerous and range from direct threats such as illegal hunting, forest fires, and habitat degradation to more indirect forces such as governmental instability, poverty, and human population increase, both regionally and within Guatemala.

The Wildlife Conservation Society began supporting conservation in Guatemala in the 1980s by funding field investigations of Guatemalan biologists who later played key roles in the first decade of the management of the Maya Biosphere Reserve. In 1991, WCS initiated studies to determine the status of wildlife hunted for subsistence in Tikal National Park and the forests of the village of Uaxactún. By 1998, this project evolved to support the management of Uaxactún in collaboration with OMYC, S.C (Organización Manejo Y Conservación, Sociedad Civil), and Uaxactún's community institution responsible for the management of the 83,558 ha concession. In 2001, WCS supported the establishment of Asociación Balam, a national NGO dedicated to the conservation of the natural and cultural resources of the Maya Biosphere Reserve. Balam is currently seeking the co-administration of Mirador-Rio Azul National Park in the northeast corner of the reserve. In 2002, WCS began monitoring the biological integrity of the MBR with support from USAID-Guatemala. In Sept 2004, biological monitoring activities funded by USAID Guatemala terminated, and in June 2005, WCS Guatemala released a final CD evaluating the integrity of landscape processes, the impacts of multiple-use zone management, and the efficacy of park protection. Specific activities noted in the report include: remote sensing to monitor changes in forest cover and fire, studying scarlet macaw (A. macao) population distribution and nesting success, investigating the impacts of timber extraction on biodiversity, evaluating the sustainability of xate palm (Chamaedorea spp.) frond extraction, evaluating the effectiveness of park protection in Sierra Lacandon NO National Park, and rapid ecological assessment of the Rio Azul watershed. In 2004, biological monitoring activities were expanded to include a collaborative effort with CONAP and the Critical Ecosystem Partnership Fund to protect critical nesting sites of scarlet macaws located within Laguna del Tigre National Park. WCS efforts in Guatemala are supported by cooperative agreements with both CONAP (Consejo Nacional de Áreas Protegidas) and IDAEH (Instituto de Antropología E Historia). Collaborators in the myriad WCS activities in the MBR include CONAP, IDAEH, OMYC/Uaxactún, ACOFOP-Asociación de Comunidades Forestales de Petén, LightHawk, National Wild Turkey Federation, Proyecto Pavo, Asociación Balam, Defensores de la Naturaleza, Tikal National Park, Parkswatch, Tropico Verde, the village of Paso Caballos, and Rainforest Alliance, among others.

First-year MBLLP activities were designed to incorporate the landscape species approach into local conservation strategies, while building upon the foundations of three WCS programs in the eastern section of the Maya Biosphere Reserve (MBR). Second-year MBLLP activities focused to a large extent on the areas deemed most critical given the results of biological monitoring activities, specifically the scarlet macaw nesting areas in eastern Laguna del Tigre. Yet the project also advanced with the development of species landscape models and with the definition of methodologies to permit species sampling. Third year activities will thus continue to focus on the macaw nesting zones while initiating wildlife sampling and strengthening Asociación Balam and community based efforts throughout the reserve.

The Maya Biosphere Reserve Living Landscape Strategy

The overall goal of the BCLS program in the Maya Biosphere Reserve is to conserve wildlife species and their habitat in the MBR while maintaining the economic productivity of renewable natural resources. To ensure conservation of the MBR's biological diversity, the BCLS program focuses on three interrelated objectives, and a fourth objective which is the mandate of the New York Coordination Unit:

[1] Myers, N., R.A. Mittermeier, C.G., da Fonseca, G.A.B., & Kent, J. 2000. Biodiversity hotspots for conservation priorities. Nature 403: 853-858

1. Develop an adaptive and participatory strategy to reduce threats to wildlife in the MBR.
2. Develop, implement and monitor sustainable mechanisms to reduce threats to wildlife and ecosystems across the MBR landscape.
3. Learn and teach best practices for conservation of the MBR landscape and beyond.
4. Guide the design and testing of wildlife-focused planning

Nine main threats were previously identified as major sources of stress on the biological integrity of the Maya Biosphere Reserve. These threats include: hunting; market demand for wildlife; timber extraction and associated activities; theft of macaw fledglings from nests; unsustainable xate palm frond extraction; forest conversion; forest fires; uncontrolled human access; and the lack of information at the local level. However, monitoring of the reserve and continuous feedback from partners throughout the project allows interventions to be reformulated when threats change in severity or when new threats emerge.

The vast landscape of the MBR precludes the development of a strategy that addresses all threats in all places at all times. Instead, the project continues to develop and evaluate the effectiveness of a series of innovative pilot interventions designed to provide guidance for future conservation efforts in the MBR and beyond. These pilot interventions focus on keystone areas considered crucial to maintaining the current biological integrity of the reserve. Third-year project areas include El Peru-El Burral-La Corona, forest concessions, Uaxactún, and Rio Azul. With the exception of market demand for wildlife, interventions will address all threats identified during the second year of the project.

The set of activities selected for implementation in this third year build on previous efforts while attempting to adapt to the new conditions observed through WCS monitoring in the reserve, as well as information drawn from preliminary biological and human landscapes refined in the second year of GCP funding. For example, WCS Guatemala staff are developing one project to research the abundance and distribution of the Central American river turtle (Dermatemys mawii)[2], and another project with a Guatemalan private sector individual to bolster the population of scarlet macaws in the eastern Laguna del Tigre area. Both projects respond to new information identified in the second year of activities, namely a lack of information on distribution and abundance in the case of the river turtle, and a lack of fledgling recruitment and links to Guatemalan interests in the case of the scarlet macaw.

Regarding the important biological monitoring activities detailed in this 2005-2006 implementation plan, WCS Guatemala will require additional financial assistance to undertake all the activities outlined below. Nevertheless, a pre-proposal was requested by USAID Guatemala to evaluate the possibility of providing the support needed to continue these activities in their entirety. The Critical Ecosystem Partnership Fund (CEPF) will continue to be another important partner for MBLLP activities in the upcoming fiscal year via the facilitation of an updated Master Plan for Laguna del Tigre, and investments in the protection of the macaw nesting areas in conjunction with CONAP and the community of Paso Caballos.

IMPLEMENTATION PLAN: FY06

OBJECTIVE 1: Develop an adaptive and participatory strategy to address threats to wildlife in the Maya Biosphere Landscape

Previous experiences and investments in the Maya Biosphere Reserve have demonstrated the importance of the involvement of local people in making conservation work. Looking towards the future, increasing pressure on the MBR from non-local colonization further supports the premise that future conservation objectives will work best where local support is strong. With these principles in mind, participation is a crosscutting approach that constitutes the point of departure for most LLP activities. In some cases, "participation" consists of consultations and evaluations with community members and institutions that represent community interests. In other cases, "participation" includes full involvement in the design and implementation of an activity or set of norms.

[2] CA river turtle is listed as endangered by IUCN and was added due to its exclusive use of large water bodies and its high threat status

The following four activities will be pursued within Objective 1 during FY06:

Activity 1.1 Develop an updated and participatory strategy for the conservation of macaws

During FY 05 we wrote and edited the Participative Strategy for Macaw Conservation. During FY06, we will share this document and finalize validation with all the principal stakeholders. The Strategy will be analyzed with local and external stakeholders. With internal stakeholders, we will hold one or two workshops until we reach a consensus and then send the validated document to the external stakeholders for review and feedback.

In order to validate the "Protocol for handling confiscated macaws in the MBR," we will carry out two workshops: One will be to edit the document (Workshop 1); and a second one to present it to Central CONAP authorities and make the document official through a resolution of the Executive Secretary (Workshop 2). The editing workshop will be carried out in Petén with the participation of all the GSF[3] consortium representatives, while the second workshop will be presented by GSF representatives to authorities delegated by the Executive Secretary in Guatemala City. Staff from WCS and CONAP will organize and report on the workshops. Fundación Defensores de la Naturaleza and Asociación de Rescate y Conservación de Vida Silvestre (ARCAS) have been invited to participate in the workshops and designate a representative each to the GSF consortium.

Results/outputs:
A Participatory Strategy will be published and distributed to partners in 2006.

Threats addressed:
Market demand for wildlife; timber extraction and associated activities; theft of macaw fledglings from nests; forest conversion; forest fires; uncontrolled human access; lack of information at the local level.

Activity 1.2 Refine biological models and produce conservation landscapes for landscape species

Last Fiscal Year, we developed a preliminary document titled "The Maya Forest Living Landscape; A Conservation Strategy Based on Wide Ranging Species" and are now soliciting feedback on species models from conservation partners and biologists to improve them. Main challenges include collecting data on species to allow model refinement, as well as accumulating better information on the threats within the landscape.

This year WCS and CEMEC staff will prioritize updating information on threats, mapping full road access during the dry summer months and incorporating this new information within the conservation landscape for all species. Conservation landscapes are generated by overlaying habitat quality maps for a given species with the spatial distribution and intensity of the threats facing that species. Please see **Appendix 1** for additional details on this activity.

Results/outputs: Improved biological models for selected species and conservation landscapes for the landscape species across the Maya Biosphere and beyond.

Threats addressed:
Hunting; timber extraction and associated activities; theft of macaw fledglings from nests; unsustainable xate palm frond extraction; forest conversion; forest fires; uncontrolled human access; lack of information at the local level.

Activity 1.3 Estimate the financial investments needed to ensure the long-term conservation of the Laguna del Tigre National Park

WCS, CEPF, CONAP, and IDAEH efforts to update the Laguna del Tigre Master Plan have proceeded well given the trying circumstances within the park. It is widely recognized in Guatemala that the Laguna del Tigre area will remain significantly impacted by land invaders and pastoral activities for the near future, and in all likelihood, some 50,000 ha

[3] GSF stands for Macaw Without Borders Consortium in Spanish

will be re-zoned to permit established communities to remain in the area. A major challenge exists in the upcoming Guatemalan elections, looming two years away, as some political actors push for the abolition of conservation status for some areas of the park. The Master Plan promotes the "least worst" scenario based on a plan to rezone the inhabited areas to reduce the threat of conflicts with established settlements, and expand the park's core into the macaw nesting sites located and monitored by WCS (El Burral, Lo Veremos-La Corona). Within this new plan, a major focus is placed on protecting the still intact areas of the park, and as such partners in the plan will develop a financial investment strategy to make this possible.

Key activities and methodology
WCS and CEPF partners will continue to facilitate the development of the plan and produce a brief document describing the consensus investments required to maintain the park's biodiversity, and their respective priorities. Once produced, the investment plan will serve to guide joint fundraising efforts by the Government, donors, and NGO's involved in stabilizing the park. Upon termination of the various sections of the draft Master Plan, the document will be evaluated by CONAP prior to final approval and implementation.

Results/outputs: An updated 2005-2010 Master Plan of Laguna del Tigre National Park, with its respective financial strategy.

Threats addressed: Lack of information at the local level, and lack of a joint understanding of priorities for Laguna del Tigre National Park.

Activity 1.4 Develop an institutional partnership to promote biodiversity conservation and protection within the Multiple Use Zone of the Maya Biosphere

WCS has successfully supported community-based protection initiatives with OMYC of Uaxactún and Paso Caballos of Laguna del Tigre. The OMYC "Control and Vigilance Committee" (C&V) is now entering its third year in operation thanks to the support of Rainforest Alliance and CONAP. Initial contacts with community leaders in AFISAP and La Colorada indicate that C&V support would be welcomed by the leaders and ACOFOP alike. Implementation challenges for this activity include the limitation of funding for local committees and the lack of local preparation in terms of map reading and GPS use.

This year we will therefore develop a partnership with Rainforest Alliance to forge institutional alliances with ACOFOP, key communities, CONAP, Trópico Verde, and others interested in the strengthening of norms within the community forest concessions. Roan McNab of WCS will co-develop a proposal for extension of the OMYC C&V model to other community concessions, including Carmelita, AFISAP, and La Colorada, and ensure ACOFOP participation in the structuring of activities. This proposal will then be vetted to receive feedback from CONAP Multiple Use Zone personnel and community concession leaders. Lastly, with ACOFOP's support a brief pilot project will be undertaken with the La Colorada community concession in the late winter of 2005.

Results/outputs:
Results include the development of alliances with Rainforest Alliance, ACOFOP, OMYC, AFISAP, La Colorada, Trópico Verde and CONAP. Besides the strengthening of Uaxactún C&V committee and the formation of the new La Colorara and AFISAP C&V committees

Threats addressed:
Hunting; market demand for wildlife; timber extraction and associated activities; theft of macaw fledglings from nests; unsustainable xate palm frond extraction; forest conversion; forest fires; uncontrolled human access; and the lack of information at the local level.

OBJECTIVE 2: Develop and implement sustainable and adaptive mechanisms to strategically address threats across the Maya Biosphere Reserve landscape

Initial MBLLP conservation interventions were selected jointly by WCS and CONAP members (Consejo Nacional de Áreas Protegidas – National Park Service) based on extensive local experience and previous threats analyses (AID/FIPA/WCS 2002, TNC/CONAP 2001). An updated threats analysis incorporated into the preliminary human landscapes (developed during FY05) and the results of WCS biological monitoring activities in the biosphere helped provide a more complete understanding of local conservation needs and challenges. Many of the threats have a direct impact on the wildlife of the MBR; for example, subsistence hunting, commercial hunting, trophy hunting, poaching for the pet trade and the forest fires. While the illegal colonization, habitat conversion, development of new roads and development of large infrastructure impart indirect impacts on wildlife. Some threats are present in higher degrees or levels in different areas; for example, while colonization (with all its combined impacts) is a serious threat to Laguna de Tigre National Park, areas like Mirador-Rio Azul National Park on the north eastern border have not yet been impacted upon by this threat.

Four strategic control bases were strengthened (El Peru, El Burral, Lo Veremos and Peñón de Buena Vista) to control the spread of illegal invaders, and to permit limited access to remote areas by combined patrols during the Last 2 Fiscal Year. We based our protection efforts on the location of 77 active and potential macaw nests distributed across an area of approximately 50,000 hectares. WCS also subsequently administered funds provided by CEPF and AID-DOI to strengthen the combined protection efforts of CONAP and SEPRONA, in some cases in tandem with the Guatemala army. In nesting areas monitored by WCS personnel, where protection was also present, only one nesting tree was climbed by poachers during the nesting season (in the Peñon de Buena Vista area).

Basic infrastructure was improved in the El Burral and Lo Veremos areas to facilitate future protection efforts; this included maintenance to access routes, field houses, bathrooms and boat docks. Guardhouses for CONAP, SEPRONA, and other collaborators were built at El Perú.

As in 2003, during 2005 we monitored and controlled several fires in the Laguna del Tigre National Park and the Central Biological Corridor with the support of SIPECIF[4], CONAP, Proyecto Arqueológico Waká-Perú and IDAEH. During the 2005 fire season we also provided technical assistance to the Fire Control Committee of AFISAP, Carmelita, and the Paso Caballos community, particularly with the use of the backpack leaf blowers donated by the Plant Family Foundation and Rainforest Alliance to clear fire lanes. All of these activities were aimed at reducing the threat of fire in Macaw nesting sites.

With CEPF funding, we tested a pilot project to involve the members of the adjacent community of Paso Caballos in the conservation of macaw and their habitat. Four members of Paso Caballos were employed to establish a campsite in the Peñón de Buena Vista region. This was an important advance as we were not able to monitor or protect this region last season due to the lack of personnel.

During FY06, ten activities will be pursued within Objective 2 of the project.

Activity 2.1. Enforcement of species conservation regulation –scarlet macaw nest protection

We will continue to strengthen protection based out of the four camps established in the eastern Laguna del Tigre area. Field technicians who monitor macaw nesting success will further support the protection and patrol system by providing information on detected incursions of people to the WCS-CEPF technician, who will be the liaison for CONAP, and SEPRONA police posted in the area.

We will continue the Pilot Project for Community Control, vigilance and monitoring of macaw nests in Peñón de Buena Vista in Laguna del Tigre National Park. This year, the group will be more independent and we will place more emphasis in developing their capacities, especially in the use of field equipment (GPS, compass, rangefinders, digital cameras, computers, telecommunication equipment, etc.), security rules and basic knowledge of the Guatemalan Protected Areas Law. We also plan to integrate the Tourism Committee of Paso Caballos to help ensure the project's long-term viability, and is expected to promote and implement the macaw observation tour in Peñon de Buena Vista.

[4] Sistema de Prevención de Incendios Forestales (Forest Fire Prevention System)

Field technicians will also be in charge of the maintenance of five artificial nests they installed last year. The Control and Vigilance Technician of the Laguna del Tigre National Park and LLP directors will coordinate the patrol schedules and routes.

Results/outputs:
Report on the results of WCS-CEPF, CONAP and SEPRONA protection efforts; improved community involvement in the management and protection of scarlet macaws nesting sites.

Threats addressed:
Hunting; theft of macaw fledglings from nests; forest conversion; forest fires; uncontrolled human access; lack of information at the local level.

Activity 2.2. Enforcement of protective regulations –road barriers

We are testing the road barriers as enforcement mechanisms for protective regulation. These road barriers are designed to prevent and/or reduce unregulated and unlawful access to MBR National Parks and Community Forest Concessions in order to prevent most of the threats affecting the reserve.

We installed and monitored a road barrier in the Mirador-Río Azul National Park in October, 2004. Unfortunately, the road barrier was destroyed by traffickers of human migrants and has not been reinstalled. This road barrier had been approved by the municipality of Melchor de Mencos and the adjacent Laborantes del Bosque community forest concession. WCS and CONAP have decided to reconstruct it after making changes in its design to make it permanent, but before this occurs WCS will approach the municipality of Melchor again to solicit their support and inform them of the demonstrated threat to the area.

Resources required to construct a road barrier at the crucial site of "Achiotal" in the western Multiple Use Zone were made available to CONAP via fire protection grants provided to WCS by the CEPF and USDOI in 2005. Plans for the construction of this post were delayed during the fire season due to lack of personnel, and have now been delayed again, temporarily, due to the severity of the wet season. WCS expects that CONAP personnel will build and man the post beginning in January of 2006.

The installation of the road barrier proposed for the Caobitas campsite is on standby, mainly due to the difficulties involved in transporting the materials to the area and the insecurity of the area. The campsite is a temporary forest campsite installed to protect their forest concession at the limit between Laguna del Tigre National Park and the AFISAP forest concession. The maintenance we provided to the access routes will soon permit the construction of the road barrier at this site. In addition, we have proposed the installation of another road barrier in the area between the Paso Caballos community polygon and the Peñon de Buena Vista district. The effectiveness of barriers will be evaluated periodically by monitoring vehicle passage, attempts at vandalism, or development of detours.

In support of Asociación Balam, the road barrier in the easternmost sector of Mirador-Rio Azul National Park will be reconstructed without a swinging gate, and made to function as a permanent road block for vehicle traffic entering the park in this area.

Results/outputs:
Results for FY06 include the Mirador-Río Azul National Park road barrier re-installation, and the installation of the Achiotal, Caobitas and Peñón de Buena Vista road barriers. Including the monitoring program of the road barriers

Threats addressed:
Uncontrolled human access.

Activity 2.3. Surveys for macaw nest in timber concessions

We've conducted searches for additional nests in AFISAP with the help of community members and held meetings with the concession leaders, expressing the importance of conducting an inventory of all the nests within the AFISAP concession area. One impetus for their participation was the contribution this biodiversity protection added toward AFISAP's Smartwood certification seal. We have also begun to search for nests in the La Colorada Concession, adjacent to AFISAP and Laguna del Tigre National Park. The searches in La Colorada have not been as extensive and we are still in the process of establishing contact with the directors to consult with all the stakeholders on other sites to look for the nests. AFISAP and La Colorada are the only two concessions with registered nests within their territories.

We will continue with the search for nests in the AFISAP and La Colorada forest concessions, using the standard method of searching from lookout points in emergent trees that rise above the canopy and from along trail walks. We will also consult with forest concession actors on the best areas for this activity. We will establish contact with the La Colorada authorities to obtain their permission and participation in the search, as was done in AFISAP forest concession. At the end of the searching season, we will make an official presentation of the results to the forest concession authorities.

Results/outputs:
A final report with the results of searches in AFISAP and La Colorada forest concessions

Threats addressed:
Timber extraction and associated activities; theft of macaw fledglings from nests; lack of information at the local level.

Activity 2.4. Test and evaluate xate management alternatives

In July of 2005 a joint pilot project by Rainforest Alliance (RA), WCS, and OMYC initiated the first ever selective harvest of xate within the Maya Biosphere Reserve. Interest by Continental Greens of Houston, Texas, in developing a certified market for xate was brokered by RA, and field implementation of the pilot project was supported by WCS. By paying harvesters for high-quality fronds only, the amount of poor-quality fronds harvested has dramatically declined – which should lead to more sustainable harvests.WCS developed an interactive spreadsheet used by collaborators to help decide how much each frond should be worth to a xatero based on a comparison with the previous market, and on a projection of the bodega's operational costs. However, sustained subsidies are needed for the project as OMYC continues to develop the infrastructure to maintain the project over the long term (i.e. a cold storage room, a vehicle, and operating capital), as well as any potential challenges to the project that may arise from the already established (parallel) xate industry that pays xateros based on bulk, and not on quality.

During FY06, we will therefore continue coordination with RA to support OMYC's efforts, improving the administrative potential of the bodega via support from WCS extension staff Benedin García and OMYC accountant Adan Palencia, and assisting OMYC to develop proposals for the funding needed to establish a cold storage room. In addition, WCS personnel will visit Carmelita and Uaxactún quarterly to monitor the percentage of unmarketable "waste" being harvested by xateros.

Results/outputs:
A final report with recommendations for future efforts in other areas, including the quarterly reports of the monitoring of percentage of unmarketable "waste" being harvested by xateros in Carmelita and Uaxactún.

Threats addressed:
Unsustainable xate palm frond extraction; lack of information at the local level.

Activity 2.5. Monitor trends in landscape cover

Under the WCS joint venture with CONAP and the Centro de Monitoreo y Evaluación (CEMEC mapping institute), we will continue to analyze trends in landscape cover and fire prevalence across the MBR, with a detailed focus on the eastern edge of Laguna del Tigre National Park – the fire and immigration frontier that threatens the scarlet macaw nesting areas, and the still- intact dense forests of the eastern Maya Biosphere Reserve. Ongoing surveys will help

identify current "threat hotspots", and continue to allow WCS with CONAP to strategically target threat abatement activities. Work will be executed from Oct 2005 through Sep 2006, and will require the acquisition of satellite images during and after the spring months (Feb-May) when skies are clear and the majority of forest fires and clearing occurs. As an additional activity we are going to model future deforestation based on the observed trends of 1986-2005 in order to produce an interactive tool that will allow us to model future deforestation under different scenarios. For additional details on this activity please see Appendix 2.

Results/outputs:
Results include an annual assessment of landscape cover changes and the prevalence of fire within the distinct management units (parks, concessions) across the MBR.

Threats addressed:
Forest conversion; uncontrolled human access; lack of information at the local level.

Activity 2.6. Monitor trends in precipitation and climate (assessing fire risk)

We will evaluate incoming data and execute the early alert system on fire risk based on the analysis of weather data and phenological observations obtained from analysis of MODIS EVI data and field surveys. This system will enable us to predict the potential risk of the fire season by late February or early March. It will also improve management decisions in SIPECIF, ranging from budget requests (based on the seasonal outlook) to a final report on the levels of weekly reported risk. Besides this new activity we are going to continue monitoring fires during the fire season (March-June) using fire pixels from MODIS, producing periodic reports and daily updates on the current situation. These products will be distributed as usual via email to numerous government and non-governmental stakeholders, including the press and local communities. Last year this information predicted the severity of fire expected, and the Guatemalan Government declared an orange alert (http://www.prensalibre.com.gt/pl/2005/marzo/15/109971.html) that among other results increased the budget assigned to SIPECIF to fight fires. For additional detail on this activity please see Appendix 2.

Results/outputs:
Preliminary report on the patterns of climate within the Maya Biosphere Reserve through September 2006.

Threats addressed:
Forest fires; lack of information at the local level.

Activity 2.7. Monitor trends in macaw population

We have monitored the nesting success of macaws during the last three breeding seasons in El Peru and Burral (2003-2005). Each season we visit tree cavities and check them to determine nesting activity, number of eggs, hatchings, depredated chicks, and successful chicks. Unfortunately, in 2005 we were not able to document the nesting success in the Lo Veremos-La Corona area due to an incident with invaders of adjacent areas.

For the last 2 years, due to a lack of personnel we had not been able to monitor the nests in el Peñón de Buena Vista constantly. With the support of the Paso Caballos COCODES (municipal leadership group), we hired four local men to train and monitor the natural nests and 5 artificial nests they built the previous year prior to the 2005 season. We registered 3 chicks that fledged successfully from the Peñón nests. In addition, WCS field technicians were very excited by the discovery of a new nest in the area by the newly trained Paso Caballos guard-monitors.

We will continue to monitor tree cavities in Peru, Burral and Peñon de Buena Vista, and if security conditions in the area permit, we will also include Lo Veremos. With replicated visits to each tree cavity known to us, we can determine temporal and spatial patterns, activity, number of eggs, number of chicks, number of depredated chicks and number of successful chicks. Information on breeding activity will be shared with protection field staff (WCS-CEPF) that coordinate field patrols and general activities of the control and vigilance of the area. At the end of the breeding season 2006, we will make an official presentation of the results to the Department of Wildlife in CONAP authorities and other interested stakeholders.

We have also chosen 3 communities to develop our pilot project of monitoring macaw nesting success by school children; Paso Caballos, Pipiles and La Colorada. Each community possesses particular characteristics that distinguish one from another. Paso Caballos is a Queq´chí community that established itself within the limits of the Laguna del Tigre National Park and is now delimited by a polygon approved by CONAP; Pipiles is a ladino community situated outside MBR limits which is within the suspected migration route of the macaws, and the area retains a few nests in some isolated forest patches. La Colorada is also a ladino community located within the Multiple Use Zone of the MBR which is a forest concession.

We have already proposed this project to the community teachers and count on their support, as well as that of their respective COCODES. The nest chosen by the elementary school children of each community is monitored twice a month during reproductive season. During each visit, one or two of the students will have the opportunity to climb the trees with the help of climbing equipment to observe and photograph the development of the eggs and chicks in the nest. Each school will elaborate a mural with the pictures representing the different stages of development of the macaws. At the end of the breeding season, we will present the schools with a diploma recognizing their involvement and support in the macaw conservation program. This diploma will be awarded by local authorities along with the WCS-Guatemala personnel during a closing ceremony. A television program "Enlace con la Naturaleza" ("Ties with nature") is scheduled to televise the closing ceremony events.

Results/outputs:
Results include the identification of areas subject to nest robbing to better orient protection efforts, and an annual report detailing nest distributions and nesting success across the eastern MBR, including the community and elementary school monitoring reports.

Threats addressed:
Theft of macaw fledglings from nests; forest conversion; forest fires.

Activity 2.8. Develop methodologies to monitor trends in selected landscape species

We are evaluating methodologies to monitor trends in our selected landscape species for the purposes of developing indicators of long-term conservation success across the landscape, for developing improved conservation models based on human and biological landscapes, and to propose targeted management actions designed to reduce threats on wildlife.

Last year we estimated jaguar density in the Mirador-Rio Azul National Park and Gallon Jug Private Reserve in Belize using remote detection cameras. This was the first step of a bi-national study (Belize-Guatemala) aimed at estimating jaguar density and monitoring this species in the eastern Maya Forest. During this study we also obtained relative abundance indices for other large vertebrate species. We will replicate this study in FY06 to determine possible fluctuations in jaguar densities and large vertebrate abundance indices. In addition, with the support of the Jaguar Conservation Program of WCS, we are organizing a workshop in Tikal National Park from September 20-24th to train WCS-Petén field technicians, Guatemalan university students, and other colleagues in camera-trapping techniques. Course instructors include Drs Scott Silver and Leonardo Maffei. Immediately following the workshop, we will implement a pilot project to estimate jaguar density with remote detection cameras in Tikal National Park (TNP) with logistical and field support from the Biology Unit of TNP, Asociación Balam, San Carlos University of Guatemala and WCS field technicians. This project will be funded by the National Council of Science and Technology with logistical and field support from Balam and San Carlos University Biology students.

With the support of the Jaguar Conservation Program of WCS-International, we have attained supplemental funding to carry out surveys with cattle ranchers and local people around the MBR to determine the impacts of jaguars and pumas on livestock and characterize cattle ranching activity in the MBR. We will also determine their knowledge of conservation laws and practices and their interest in conservation programs. The cattle ranchers will be asked to inform us when their livestock suffer from attacks, and we will visit them to characterize these attacks.

With the aid of WildTrack we are developing an algorithm that we will use to identify individual tapirs through their tracks. Project staff will collect tracks of as many individuals as possible using digital cameras, while WildTrack will develop the analytical algorithm for us. We have photographed 220 tracks of 22 specimens in captivity with the support of various Guatemalan zoos (La Aurora, IRTRA and AutoSafari Chapin) and the Belize Zoo, as well as tracks of various specimens in the wild in Corcovado, Costa Rica. If the WildTrack algorithm is effective, we will develop a pilot plan to field-test the method and eventually fine-tune the tapir distribution map in the MBR. Through surveys we will redefine tapir distributions, threats, and priority sites for conservation.

Using Mark-Recapture models, we have been carrying out several experiments with reflective marks placed on crocodile heads and turtle shells in various closed water bodies in the MBR. Using previously established reflective mark codes, we will "recapture" individuals by spotlighting to identify them by their unique reflective patterns in subsequent sampling sessions without having to physically recapture them.
In this way we will estimate crocodile and river turtle density in the principal bodies of water in the MBR. We will design our study based on various parameters in the bodies of water in the MBR: size, depth, types of bodies of water, connectivity, clearness, aquatic vegetation, etc. These variables will be correlated to the densities estimated for future improvement of species habitat models, and therefore strategies for their conservation.

We will evaluate several methodologies for estimating white-lipped peccary abundance in the Mirador-Rio Azul National Park. These methodologies consist of placing remote detection cameras and making observations from platforms at waterholes the animals visit daily. The observation platforms will allow us to study white-lipped peccary with both field technicians and volunteers. The waterholes will also be characterized to determine dominant vegetation, and other important physical characteristics (size, water availability, light availability, soil types, etc).

Results/outputs:
Results include a final document detailing selected and improved methodologies and estimated effort/cost required for monitoring our landscape species.

Threats addressed:
Hunting; timber extraction and associated activities; theft of macaw fledglings from nests; forest conversion; forest fires; uncontrolled human access; lack of information at the local level.

Activity 2.9. Initiate contact with the private sector to promote conservation initiatives

WCS was contacted by a Guatemalan philanthropist who owns a huge collection of scarlet macaws, and who would like to contribute chicks bred in her aviary as a source for possible reintroductions into the park. Challenges for successful implementation of a reintroduction program include identifying and isolating healthy macaws in reproductive pairs, and raising the funds needed to screen for pathogens prior to breeding and releasing of chicks. Aside from being a positive contribution from the private sector, such support would also strengthen macaw conservation initiatives politically, as one of the greatest weaknesses of WCS Guatemala field efforts is our lack of support among powerful actors in Guatemala City.

We will continue coordination with the WCS Field Veterinary Program to design a captive breeding and wild release program, and estimate the costs involved. We will also inform private sector participants of the results of their support for local conservation efforts.

Results/outputs:
Results include the development of alliances with Aviarios Mariana (a Guatemalan wildlife breeding Company) and CONAP to strengthen possible initiatives.

Threats addressed:
Theft of macaw fledglings from nests; forest conversion; forest fires; uncontrolled human access.

Activity 2.10. Overflights of the Maya Biosphere

With the support of LightHawk, WCS Guatemala coordinated and executed overflights with governmental, non-governmental, and community-based representatives, and with members of the press to educate people about the trends affecting the Maya Biosphere landscape. The scarce availability of airplane fuel hindered some of the flights planned for 2005, but in general the program was successful in providing a number of important stakeholders with an aerial perspective of the MBR during the most stressful period (dry season).
We will continue with the overflights with the same effort as previous years.

Results/outputs:
Results include greater national awareness of the MBR's true conservation status, an assessment of the scale and geographic distribution of threats to the forest, reports to CONAP detailing findings, and improved protection of remote sections of the reserve. Besides, the aerial photographs taken by WCS technicians and the invited journalist will be used for focus the attention in the MRB conservation by the public opinion.

Threats addressed:
Timber extraction and associated activities; forest conversion; forest fires; uncontrolled human access; and the lack of information at the local level.

OBJECTIVE 3: Learning and teaching best practices in the Maya Biosphere Reserve landscape and beyond

The LLP in the Maya Biosphere Reserve will continue to focus on pilot interventions aimed at testing new approaches to biodiversity conservation with the involvement of local actors, while also disseminating the lessons learned during FY05. To best do this, WCS Guatemala staff will maintain a constant dialogue with local actors such as CONAP, IDAEH, partner communities, ACOFOP, and other NGOs to ensure the feedback loop permits immediate adaptive management adjustments. In regards to the monitoring of vegetative cover and forest fires, WCS will make data immediately available to local actors, in some cases on a daily basis. With this objective, two activities have been scheduled for the second year of the project in Guatemala:

Activity 3.1 Evaluate the effectiveness of pilot projects promoted

In FY05, WCS evaluated our pilot projects and provided recommendations for improved management in our FY05 Annual Report. Results of on-going pilot projects have also been disseminated regularly at the local level with CONAP and IDAEH personnel, especially in the case of the projects involving community management of the Peñon de Buena Vista (positive results), the advances with improved xate management (positive results), and the construction of the unmanned road barrier (negative results indicating significant threats in the area). Results of these projects have also been shared with other donors such as the CEPF (esp. macaw protection, both in El Peru-El Burral, and in the Peñon de Buena Vista with personnel from Paso Caballos) helping to attract interest in sustaining funding for the area.

WCS personnel will consult with CONAP staff and local communities involved to evaluate the on-going effectiveness of pilot projects such as: the placement of road barriers (Activity 2-2); the various projects associated with macaw conservation (Activities 2-1, 2-3); xate management (Activity 2-4); and others. Evaluations will consist of monitoring data for landscape species where available (i.e. macaws), forest cover, and participatory consultations with actors involved with, or affected by, project activities (i.e. Paso Caballos).

Results/outputs:
Results include a final report detailing the results compiled by the end of FY06, and suggestions/recommendations for the future.

Threats addressed:
Hunting; timber extraction and associated activities; theft of macaw fledglings from nests; unsustainable xate palm frond extraction; forest conversion; forest fires; uncontrolled human access; and the lack of information at the local level.

Activity 3.2 Strengthen Maya Biosphere Reserve and global conservation initiatives

To date, WCS Guatemala staff have conducted a pilot survey on natural resource protection initiatives of WCS LLP sites around the world and made these results available to LLP staff. During FY06, with the help of NY LLP staff, WCS Guatemala will sample five additional sites for inclusion in the survey. Results from this will indicate opportunities for cross-learning, and help identify some of the dos and don'ts of protection.

MBRLP staff has contributed lessons on monitoring and landscape design to annual LLP meetings. WCS also provides public presentations to numerous institutions on the results of project work, both in Guatemala and in the US. Important messages on impacts of timber and xate harvests and forest cover loss due to fires have been seriously received, and field methods welcomed. How about Roan's presentations in Washington?

WCS Guatemala staff will also be revisiting Washington DC during FY06 to raise awareness about the need for additional Congressional support for conservation and sustainable management activities in the Maya Biosphere, as well as the dangers of not continuing US Government investments in the area.

Results/outputs:
Results include the addition of new perspectives and methodologies to LLP sites (including the Maya Biosphere Reserve), and hopefully the avoidance of conservation mechanisms proven to be unviable in other sites. Results from the biological monitoring project will be presented in final reports, and selected elements of the reports will be prepared for publication in referred journals. A draft report on the trends regarding protection will be produced for internal evaluation of approaches at LLP sites.

Threats addressed:
Lack of information.

Objective 4: New York Coordination Unit Strategy: Guide the design and testing of wildlife-focused planning, implementation, and evaluation tools for effective conservation at a landscape scale, and promote learning across sites and beyond

The NY-based Coordination Unit (CU) of the program is designed to develop and test wildlife-focused, landscape-scale approaches to biological conservation across multiple sites. To ensure the widespread utility of these new conservation approaches, the program is testing them within landscapes that encompass a diverse array of ecological features, land-uses, resource-use issues, and jurisdictional arrangements. To develop new approaches, facilitate and harmonize testing and implementation among these core sites, and capture the synergistic benefits of diverse experiences, a central coordination unit is charged with designing and managing the program. This unit guides development of landscape-scale conservation strategies, tools and techniques; assists in the design and development of cost-effective intervention and monitoring programs at these sites; promotes cross-site learning; and ensures communication among the sites, WCS staff (central and field), USAID (DC and missions), and the larger conservation community.

During FY06, the priority for the Coordination Unit will include continuing to work with field sites to further develop their conservation landscapes, and providing assistance to the process of building monitoring frameworks from conceptual models. We have now refined and simplified the process for selecting landscape species, including development of software as a decision-support tool for analysis, and during the next year, we'll develop and disseminate a 'how to' manual that will accompany the selection software. Also, based on the results from the ongoing review of the landscape species approach, we'll write up a rules of thumb document on the appropriate conditions for the use of the approach.

Activity 4.1 Provide technical assistance to site-based conservation

Members of the NY Coordination Unit will provide technical input to field site operations detailed in the previous sections of this report, some of which will involve trips to sites. (as cited)

Results/Outputs:
Focused and timely technical assistance and collaboration provided to field sites based on needs, leading to conservation landscape strategies, target monitoring of effectiveness, and processes in place to increase participation of stakeholders.

Activity 4.2 Design, implementation, and testing of decision support tools

Activity 4.2.1 Living Landscapes Program technical manuals
The Living Landscapes Program will continue to produce brief how-to guides, called Technical Manuals, after field testing and fine-tuning the methods at several WCS field sites. In FY06, we will finalize and disseminate three technical manuals that are currently in review: Building Monitoring Frameworks from Conceptual Models; Conducting Household Surveys; and Building Biological and Human Landscapes. We will also produce a technical manual on selecting landscape species. The manuals are designed to provide clear and practical instructions to field practitioners on implementing a number of conservation tools. The manuals will also be translated into Spanish and French, and disseminated to WCS projects, partners (government, NGO and local), and other conservation colleagues.

Activity 4.2.2 Landscape Species Approach progress

4.2.2.1 Building Conservation Landscapes
In May 2005, at the LLP Annual meeting, 7 landscapes presented their preliminary conservation landscapes (i.e., maps of conservation priorities) and methods for making them, including how they incorporated biological and threat information. We concluded that while Biological and Threats Landscapes were vital information for choosing priority areas, how these 2 pieces of information should be weighted against one another (e.g., protect high value, low threat habitat first or high value, high threat) is still unclear, and may differ depending on the conservation context. Additional information may be necessary to make practical decisions on where conservation activities should take place, such as cost of conservation activities, urgency of the threats, probability of success, history of the project, and opportunities.

Over the first half of 2006, LLP staff in New York will continue to refine methods for building conservation landscapes, based on what we learned at the annual meeting. By January 2006, we will have drafted a Technical Manual on building conservation landscapes that describes the various types of spatial information that could be used in prioritizing areas, and suggests options for incorporating this information into a final map of priorities (e.g., simple rules, use of decision support software such as Marxan). By the end of FY 2006, we will have distributed this draft manual, asked 3-4 sites (Guatemala, Adirondacks, Madidi, and Glover's Reef) to use the manual and make new or refined conservation landscapes, and finalize the technical manual based on the experiences of these sites.

4.2.2.2 Review of the Landscape Species Approach
Review of the Landscape Species Approach (LSA) will continue during this fiscal year. An assessment of the use of LSA tools - amount of time spent on landscape species selection, level of participation in doing threats assessment, etc – will help us draw some principles to be able to advise others on the utility of the approach, its individual steps, and the conditions under which it may or may not provide advantages to conservation. LLP intends to use the findings of the review to better adapt our program and LSA tools for the practice of site-based planning and implementation.

4.2.3 Develop monitoring frameworks at sites
Over the past couple of years, all of the demonstration sites have developed and fine-tuned their conceptual models that can now be used to design their monitoring frameworks. We will work closely with these sites as they develop and refine their monitoring frameworks and monitoring plans during the next year, ensuring that sites go beyond concepts - into the practice of project monitoring.

4.2.4. Develop rules of thumb for intervention planning
A number of project staff have highlighted the need for intervention planning and prioritization tools - How to turn research into conservation action; How to build confidence in choice of intervention activity and place; How to take

advantage of windows of opportunities, etc. During the last LLP annual meeting, the participants decided that the most useful guidance in determining priorities among interventions would be in the form of rules of thumb, and a small group began to outline some ideas that the CU will expand and make available to staff for review during the next few months.

Results/Outputs:
Technical manuals designed, tested in the field, and distributed in hard copy as well as on CDs and on-line for wider distribution. Monitoring frameworks developed for each site. A 'rules of thumb' document for intervention identification and prioritization and made available to field staff. Guidelines for effective use of LSA tools written up and made available to other site-based conservation practitioners.

Activity 4.3 Catalyze cross-site and cross-organizational learning, and communication

Activity 4.3.1 CMP: leadership, design, writing and audits
CU staff will continue to play a leadership role in the identification, design and implementation of Conservation Measures Partnership activities. We will work closely with Foundations of Success to begin population of causal chains and best-practice indicators in the Strategic Indicator Selection System (StratIS), and will work with all CMP members to identify best-practice tools to use as models for development of eAdaptive-Management modules. Lastly, we will continue to provide technical input into specifying measurable Global Indicators of Biodiversity status.

4.3.2 Local engagement in conservation survey
We will organize and host a 5-day writers retreat for several senior WCS field staff. The retreat is designed to capture their experience integrating local people into the successful practice of landscape scale conservation. This retreat follows-up a more wildly distributed questionnaire that was used to frame the theoretical and practical issues associated with effectively integrating local people into the practice of conservation. The report generated during the writers retreat will be published as a WCS International Program Working Paper and will be made available as a PDF on our website and as a hard-copy document.

4.3.3 Preliminary assessment of the human welfare impacts of establishing national parks
With funding provided by the John D. and Catherine T. MacArthur Foundation and the National Science Foundation, LLP staff in collaboration with the WCS Gabon program, the Gabon National Parks Authority and Boston College conducted a baseline household welfare survey of 1,000 households with traditional claims to natural resources within 4 national parks in Gabon, and an additional 1,000 control households living outside the influence of the parks. This survey is the first of three surveys planned over the next 5 years to assess the income, health, consumption, natural resource use, and family function impacts of establishing protected areas on local families. Results of the baseline survey will be analyzed during FY06 and will allow us to assess the role that wild resources and market access play in the welfare status of families proximal to and distant from the parks.

Results/Outputs:
Synthesis of results of local engagement in conservation surveys compiled and made available for use. Results of the baseline study will be published in a peer review journal

Activity 4.4 Application of Living Landscapes Program tools beyond core sites

4.4.1 Training workshops in the use of LLP tools
A number of workshops to train field practitioners in the use of conservation tools will be organized and implemented throughout the year. Among others, the socio-economic monitoring specialist and the program director will hold a training workshop for conservation projects as part of the WCS Marine Regional Program Meeting. We have been asked by Dr. Glyn Davies, the Director of Conservation Programs at the Zoological Society of London to run a workshop to train his global staff on the use of LLP conservation planning tools. The 2-3 day training workshop will occur in London in November, 2005. In January of 2006 we will help local and international partners in the Samburu-Laikipia Landscape in north-central Kenya to use LLP conservation planning tools to come to a common vision for wildlife conservation in this complex dry savanna landscape. We also expect to conduct a training of national park

management staff in Madagascar in partnership with the WCS Madagascar program, and Conservation International. This training will focus on the use of conceptual models as a basis for strategic site conservation planning. Lastly, we will continue to support adoption of conceptual models and monitoring frameworks by landscape scale projects in: Brazil – Mamiraua, and Piagacu Purus; Peru - Yavari Mari; Venezuela – Caura River; Ecuador – Yasuni, and Bolivia – Gran Chaco. These projects are supported by funds from The Gordon and Betty Moore Foundation.

4.4.2. Technical Manuals

We will continue to make our series of technical manuals available to conservation practitioners and decision makers on our website, as hard-copy booklets and on CD. Manuals are available in English, French and Spanish.

Results/Outputs:

Training workshops and symposium planned and held to make available the principles distilled from implementation of the USAID/EGAT funded sites over the past six years to other site-based conservation projects around the world.

Activity 4.5 Ensure coordination and communication services for the program

The program director and program coordinator will meet with staff from the core sites and other WCS large-scale conservation sites to discuss the development of the program, on-the-ground implementation of the Landscape Species Approach, and further development of tools relevant to the approach. Program staff will also meet with collaborators, NGOs, governmental officers, and representatives of other stakeholder groups to promote use of the strategies and tools, to assess their utility, and to determine whether additional tools would be of use.

Throughout the year, the Coordination Unit will assist field staff in completing annual Implementation Plans, reporting on Performance Monitoring forms, and submitting Annual Reports. The program coordinator and other members (as necessary) will attend quarterly USAID/EGAT meetings in Washington DC and will ensure regular reporting and updates to USAID.

Results/Outputs:

The Coordination Unit will serve as a hub for communication regarding the Program among WCS field staff, core sites, current and potential conservation partners and interested members of the general public. Timely preparation and submission of USAID reports.